LESSON 168

Note that all areas are in square units.

1. area = bh = 12(11) = 132

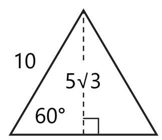
2. area = $\frac{1}{2}h(b_1 + b_2) = \frac{1}{2}$(10)(10 + 6 + 12) = 140

3. Diagonals of a kite are perpendicular.

Use the Pythagorean theorem or Pythagorean triples (3-4-5 and 5-12-13) to find b = 9 and c = 5.

area = $\frac{1}{2}d_1d_2 = \frac{1}{2}$(12 + 12)(9 + 5) = 168

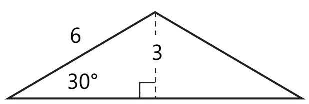
4. An altitude divides an equilateral triangle into two congruent 30-60-90 triangles.



Use a 30-60-90 triangle to find $h = 5\sqrt{3}$.

area = $\frac{1}{2}bh = \frac{1}{2}(10)(5\sqrt{3}) = 25\sqrt{3}$

5. The triangle can be divided into two congruent 30-60-90 triangles.



Use a 30-60-90 triangle to find h = 3 and $b = 6\sqrt{3}$.

area = $\frac{1}{2}bh = \frac{1}{2}(6\sqrt{3})(3) = 9\sqrt{3}$

6. area = $\frac{1}{2}sa \cdot n = \frac{1}{2}$(5)(6)(8) = 120

7. A regular hexagon is made up of 6 equilateral triangles. The apothem is the height of each equilateral triangle.

Use a 30-60-90 triangle to find $a = 2\sqrt{3}$.

area = $\frac{1}{2}sa \cdot n = \frac{1}{2}(4)(2\sqrt{3})(6) = 24\sqrt{3}$

8. Use a 30-60-90 triangle to find s = 8 and $a = 4\sqrt{3}$.

area = $\frac{1}{2}sa \cdot n = \frac{1}{2}(8)(4\sqrt{3})(6) = 96\sqrt{3}$

9. side ratio = perimeter ratio = 90/54 = 5/3

$\frac{5}{3} = \frac{x}{15}$ → $3x$ = 5(15) → x = 25

$\frac{5}{3} = \frac{20}{y}$ → $5y$ = 3(20) → y = 12

10. area ratio = 216/96 = 9/4, side ratio = 3/2

$\frac{3}{2} = \frac{18}{x}$ → $3x$ = 2(18) → x = 12 cm

11. circumference = $2\pi r = \pi d = 20\pi$

area = $\pi r^2 = \pi(10)^2 = 100\pi$

12. arc length = $\frac{\theta}{360} \cdot 2\pi r = \frac{225}{360} \cdot 2\pi(8) = 10\pi$

area = $\frac{\theta}{360} \cdot \pi r^2 = \frac{225}{360} \cdot \pi(8)^2 = 40\pi$

13. arc length = $\frac{\theta}{2\pi} \cdot 2\pi r = \theta r = \frac{5\pi}{9}(18) = 10\pi$

area = $\frac{\theta}{2\pi} \cdot \pi r^2 = \frac{1}{2}\theta r^2 = \frac{1}{2} \cdot \frac{5\pi}{9}(18)^2 = 90\pi$

14. 360°, 2π, circumference, circle area

15. $\frac{45}{360} = \frac{x}{2\pi}$

$360x = 45(2\pi)$

$x = \pi/4$ radians

16. $\frac{x}{360} = \frac{2\pi/5}{2\pi}$

$2\pi x = 360(2\pi/5)$

x = 72°

17. $\frac{\text{arc length}}{\text{circumference}} = \frac{\text{sector area}}{\text{circle area}}$

$\frac{x}{12\pi} = \frac{15\pi}{36\pi} = \frac{5}{12}$ → $12x = 5(12)\pi$ → $x = 5\pi$

18. The area of the triangle is found in Problem 5.

sector area = $\frac{\theta}{360} \cdot \pi r^2 = \frac{120}{360} \cdot \pi(6)^2 = 12\pi$

triangle area = $\frac{1}{2}bh = \frac{1}{2}(6\sqrt{3})(3) = 9\sqrt{3}$

segment area = sector– triangle = $12\pi - 9\sqrt{3}$

19. radius = 10/2 = 5

area = circle – 4 right triangles with legs 5

$= \pi(5)^2 - 4 \cdot \frac{1}{2}(5)(5) = 25\pi - 50$

20. An intercepted arc measures twice its inscribed angle.

$m\widehat{BC} = 2m\angle A$ = 80°

An arc measure equals the measure of its central angle.

$m\angle BPC = m\widehat{BC}$ = 80°

Sector BPC has radius 9 and angle 80°.

area = $\frac{\theta}{360} \cdot \pi r^2 = \frac{80}{360} \cdot \pi(9)^2 = 18\pi$

21. A circle has 360°. There are 12 hours on a clock, so each number position is 360/12 = 30° around the clock. At 2:00, the minute hand is on the 12 and the hour hand is on the 2. So, the angle between them is 2(30) = 60°.